

## Patent Claims

1. Method for the supply of bearing elements (17.1, 17.2) in a hydrodynamic coupling (1)
  - with a primary wheel (3) and a secondary wheel (4), which together form a working area (5) capable of being filled with operating fluid and with an operating fluid system (2), comprising a direct circulation (9) connecting at least one outlet (7) from the working area (5) to an inlet (8) into the working area (5), an operating fluid source (10) and at least one filling line (12), via which the inlet (8) is capable of being connected at least indirectly to the operating fluid source (10), and at least one emptying line (13), via which the outlet (7) is capable of connection at least indirectly to the operating fluid source (10), in conjunction with which the filling line (12) and the emptying line (13) are connected via the direct circulation (9) to the inlet (8) and the outlet (7), together with a lubricant supply system (16), which is capable of connection to the filling line (12);which is supplied with lubricant during all operating modes, in conjunction with which, at least during the filling mode, the supply of the lubricant supply system (16) is effected via the filling line (12) that is

capable of connection to the operating fluid source (10), characterized in that the supply of the lubricant supply system (16) is effected solely from the direct circulation (9) in the direct circulation (9) functional mode of the operating fluid between the outlet (7) and the inlet (8).

2. Method in accordance with Claim 1, characterized in that, in the circulation cooling mode, in the event of operating fluid flow from the direct circulation (9) via the emptying line (13), the supply of the lubricant supply system (16) is effected from the operating fluid source (10) via the filling line (12).
3. Method in accordance with Claims 1 or 2, characterized in that the pressure level in the direct circulation (9) is monitored and, in the event that a predefined limit value is not met, topping-up of operating fluid into the direct circulation (9) is effected by connecting the filling line (12).
4. Hydrodynamic coupling (1)
  - 4.1 with a primary wheel (3) and a secondary wheel (4), which together form a working area (5) capable of being filled with operating fluid;
  - 4.2 with an operating fluid system (2), comprising

- a direct circulation (9) connecting at least one outlet (7) from the working area (5) to an inlet (8) into the working area (5),
  - an operating fluid source (10)
  - at least one filling line (12), via which the inlet (8) is capable of being connected, at least indirectly, to the operating fluid source (10), and at least one emptying line (13), via which the outlet (7) is capable of connection at least indirectly to the operating fluid source (10);
- 4.3 the filling line (12) and the emptying line (13) are connected via the direct circulation (9) to the inlet (8) and the outlet (7);
- 4.4 the operating fluid system (2) comprises means (18) to provide or interrupt the flow of operating fluid in the filling line (12) from the operating fluid source (10) to the inlet (8) and means (20) to provide or interrupt the flow of operating fluid in the emptying line (13) between the outlet (7) and the operating fluid source (10);
- 4.5 with a lubricant supply system (16) for the supply of lubricant at least to the bearing elements (17.1, 17.2) used to support the primary wheel (3) and the secondary wheel (4);
- 4.6 the lubricants supply system (16) is connected to the filling line (12) in the direction of flow behind the

operating fluid source (10) and ahead of the means (18) to provide or interrupt the flow of operating fluid in the filling line (12) from the operating fluid source (10) to the inlet (8);

characterized by the following features:

4.7 the lubricant supply system (16) is capable of connection, at least indirectly, to the direct circulation (9);

4.8 with means for diverting operating fluid from the direct circulation (9).

5. Hydrodynamic coupling (1) in accordance with Claim 4, characterized by the following features:

5.1 the main lubrication line (21) of the lubricant supply system (16) is capable of connection directly or via a first connecting line (22, 50) via the filling line (12) to the source of operating fluid;

5.2 the connection of the main lubrication line (21) or the first connecting line (22, 50) is effected in the direction of flow between the operating fluid source (10) and the working area (5) ahead of the means (18) for providing or interrupting the operating fluid flow in the filling line (12) to the latter;

5.3 the means for diverting operating fluid from the direct circulation (9) comprise a second connecting line (23,

29, 32), which connects the direct circulation (9) to the lubricant supply system (16);

- 5.4 the connection between the direct circulation (9) and the lubricant supply system (16) is effected directly by the connection of the second connecting line (23, 29, 32) to the main lubricant supply line (21) or indirectly via the first connecting line (22).

6. Hydrodynamic coupling (1) in accordance with Claim 5, characterized in that the second connecting line (23, 29) is connected to the filling line (12) in the direction of flow observed from the operating fluid source (10) to the coupling (1) behind the means (18) for providing or interrupting the operating fluid flow in the filling line (12) to the latter, and in that the connection to the direct circulation (9) is effected via this part of the filling line (12).

7. Hydrodynamic coupling (1) in accordance with Claims 5 or 6, characterized in that, in the main lubricant supply line (21) or the first connecting line (22, 50) in the direction of flow of the operating fluid from the operating fluid source to the main lubricant supply line (21), means (24, 31) are provided for blocking the direction of flow from the direct circulation (9) to the operating fluid source (10), and in that the connection

of the second connecting line (23, 29) to the main lubricant supply line (21) or the first connecting line (22) is effected behind the means (24) for blocking the direction of flow from the direct circulation (9) to the operating fluid source (10).

8. Hydrodynamic coupling (1) in accordance with one of the Claims 5 to 7, characterized in that, in the second connecting line (23, 29, 32) ahead of the connection to the main lubricant supply line (21) or to the first connecting line (22, 50), means are provided for blocking the direction of flow from the direct circulation (9) to the operating fluid source (10, 11).
9. Hydrodynamic coupling (1) in accordance with Claim 8, characterized in that a pressure-limiting valve (30) is arranged in the second connecting line (29) ahead of the connection to the main lubricant supply line (21) or to the first connecting line (50).
10. Hydrodynamic coupling (1) in accordance with one of Claims 7 to 9, characterized in that the means comprise a nonreturn valve (24, 25) arranged in the first and/or second connecting line (22, 23).

11. Hydrodynamic coupling (1) in accordance with Claim 5, characterized by the following features:
  - 11.1 the second connecting line (32) connects the direct circulation (9) to the lubricant supply system (16) without the use of parts of the filling line (12);
  - 11.2 with means (35) for the connection of the two connecting lines (50, 32), of the connecting line for the realization of a connection between the filling line (12) and the main lubricant supply line (21), and of the connecting line (32) between the direct circulation (9) and the lubricant supply line (21) to the main lubricant supply line (21).
12. Hydrodynamic coupling (1) in accordance with Claim 11, characterized in that the means (35) comprise a controllable valve device (36).
13. Hydrodynamic coupling (1) in accordance with Claim 12, characterized in that the valve device exhibits at least two switching positions for the connection of the main lubricant supply line (21) to the filling line (12) or the direct circulation (9), as desired.
14. Hydrodynamic coupling (1) in accordance with one of Claims 4 to 13, characterized in that a filter device (26) is provided in the main lubricant supply line (21),

and in that a pressure switch (44) in a bypass (27) is also assigned to this.

15. Hydrodynamic coupling (1) in accordance with one of Claims 4 to 14, characterized in that a feed device (15) is provided in the filling line (12), and in that the connections of the connecting lines (32, 50, 22) are effected behind this.
16. Hydrodynamic coupling (1) in accordance with one of Claims 4 to 15, characterized in that means (46) for recording the pressure level are assigned to the direct circulation (9).
17. Hydrodynamic coupling (1) in accordance with one of Claims 4 to 16, characterized in that at least one diaphragm (42) is arranged in the main lubricant supply line (21).
18. Hydrodynamic coupling (1) in accordance with one of Claims 4 to 17, characterized in that means for recording the temperature in the direct circulation (9) are assigned to the direct circulation (9).



# Method for the supply of lubricant to bearing elements in a hydrodynamic coupling and a hydrodynamic coupling

## Abstract

The invention relates to a method for the supply of bearing elements in a hydrodynamic coupling

- with a primary wheel and a secondary wheel, which together form a working area capable of being filled with operating fluid and with an operating fluid system, comprising a direct circulation connecting at least one outlet from the working area to an inlet into the working area, an operating fluid source and at least one filling line, via which the inlet is capable of being connected at least indirectly to the operating fluid source, and at least one emptying line, via which the outlet is capable of connection at least indirectly to the operating fluid source, in conjunction with which the filling line and the emptying line are connected via the direct circulation to the inlet and the outlet, together with a lubricant supply system, which is capable of connection to the filling line, and which is supplied with lubricant during all operating modes, in conjunction with which, at least during the filling mode, the supply of the lubricant

supply system is effected via the filing line that is capable of connection to the operating fluid source, characterized in that, in the direct circulation functional mode of the operating fluid, the supply of the lubricant supply system between the outlet and the inlet is effected solely from the direct circulation.